Composting as a resource for environmental azole resistance mutation in *Aspergillus fumigatus*

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Objectives

Although azoles are the mainstay of therapy in the management of invasive aspergillosis, emerging azole resistance has serious implications of patient management.. Compost (decaying plant waste material) containing azole residues might be important for resistance development. of *Aspergillus fumigatus*. The aim of the present study was to assess the prevalence of resistance to triazoles in *A. fumigatus* isolates in commercially available composts in Iran.

Methods

Compost samples were collected from floristries in Iran. A total of 200 azole fungicide treated compost samples were analyzed. Two grams of each sample were homogenized in sterile saline containing 0.05% Tween 80. Suspensions were inoculated on sabouraud dextrose agar (SDA) supplemented with chloramphenicol and gentamicin. The plates were incubated at 48°C and checked daily for fungal growth. Antifungal susceptibility testing based upon the CLSI Standard broth microdilution method for filamentous fungi (M38-A2) was performed for all *A. fumigatus* isolates. A real-time PCR assay for detection of tandem repeats (TR) in promoter region and mutations in *cyp51A* gene conferring resistance to triazoles in *A. fumigatus* was utilised.

Results

A. fumigatus grew from 42 of 200 compost samples analysed. Azole-resistant isolates were detected in 6.5% (13/200) of the compost samples and in 31% (13/42) of the compost samples containing *A. fumigatus*. High minimal inhibitory concentrations (MIC) of itraconazole (≥ 16 mg/L) and voriconazole (≥ 8 mg/L) were displayed. Only four of thirteen itraconazole (ITZ) and voriconazole (VRZ) resistant isolates harboured the TR₃₄/L98H genotype. No mutation was detected in Cyp51A of isolates with high MICs to ITZ and VRZ.

A. fumigatus Culture Positive Samples n=42/200

Resistant *A. fumigatus* Isolates n=13

Conclusion

Our study shows that compost utilized in flower beds contains azole-resistant *A. fumigatus* phenotypes. TR variants confer different azole resistance phenotypes. Therefore it is emphasised that resistance surveillance studies focusing on environmental samples are warranted to monitor the emergence and prevalence of azole resistance in *A. fumigatus*. The role of exposure of immunocompromised patients to resistant *A. fumigatus* present in composting organic matter should be further analyzed.